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ECONOMIC INTELLIGENCE REPORT

EDUCATION AND TRAINING OF INDUSTRIAL WORKERS IN COMMUNIST CHINA 1950-57

CIA/RR 86
10 December 1956

CENTRAL INTELLIGENCE AGENCY

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S-E-C-R-E-T

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(ORR Project 45.925)

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FOREWORD

This report describes the techniques used by Communist China to educate and train workers for industry. The level of ability available to Chinese industry, as well as the projected training goals, is examined to evaluate the adequacy of industrial manpower to meet the production goals of the First Five Year Plan (1953-57). Because this report is limited to the education and training of industrial workers up through the level of engineers, no attempt has been made to examine the training of scientific or research workers. General education is treated mainly in its relation to the development of industrial manpower.

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EDUCATION AND TRAINING OF INDUSTRIAL WORKERS IN COMMUNIST CHINA* 1950-57

Summary and Conclusions

The shortage of engineers, technicians, and skilled workers in Communist China, although hindering the industrialization program, has not blocked the achievement of production goals of the First Five Year Plan (1953-57). Despite an extremely low technical level, the industrial labor force of Communist China has been meeting its production goals through reliance on the following techniques: intensive, widespread training of skilled workers; strict allocation of industrial skills to the areas of greatest need; and use of technical assistance from the Soviet Bloc. Communist China has made it clear, however, that dependence on Bloc technical workers is only an expedient and that the solution of the problem of technical ability in industrial employees lies in a long-range, domestic program of education and training.

The need for technical knowledge and skills in the industrial labor force of Communist China is indicated by the goal of the First Five Year Plan to employ 1 million additional specialized workers in industry during 1953-57. As a result of this increased demand, institutions of higher education were scheduled to raise their enrollment to 435,000 students in 1957, and even this figure has since been revised to more than 500,000 students. Similarly, the original Five Year Plan goals for secondary education are scheduled to be exceeded. For example, the secondary vocational schools** are to have 801,000 students in 1956, compared with the previous goal of 672,000 students for 1957, thus surpassing by 1956 the 1957 goal.

With the rapid expansion of enrollment, both the institutions of higher education and the secondary schools face serious shortages of qualified candidates. Current indications are that the high enrollment

* The estimates and conclusions contained in this report represent the best judgment of ORR as of 1 October 1956.

** For a discussion of terminology used in this report, see the second footnote on p. 7.

quotas will be met only by the expedient of recruiting students with substandard preparation. The maintenance of quality control in education will therefore become even more difficult. In an effort to counteract any drop in the quality of graduates, institutions of higher education are shifting from 4-year courses of study to 5-year courses. This shift, however, will inevitably delay the graduation of urgently needed specialists, and the large new enrollment planned for 1956 and 1957 will not be available to the labor force before 1961 or 1962.

Training of semiprofessional technicians in secondary vocational schools is ahead of the schedule of the First Five Year Plan. It seems clear that the Five Year Plan grossly underestimated the demand for these technicians in the national economy. New enrollment in secondary vocational schools for 1956 is expected to total 444,000 students, raising the number of students in 1956 to 801,000, or 149 percent of the 1955 level -- an increase which reflects a reappraisal of the role of secondary vocational schools. As in higher education, declines in quality resulting from hasty expansion will be counterbalanced somewhat by lengthening the course of study from 3 to 4 years.

Fewer difficulties are faced in the training of skilled workers, because the training period is relatively short and much of the instruction can be accomplished on the job by using available technicians or skilled workers for instructors. Approximately 900,000 workers are scheduled to increase their skills through on-the-job training, technical training classes, or technical schools during 1953-57. In addition to these efforts to raise the skill of workers, spare-time classes are attempting to eliminate illiteracy among workers and to raise the generally low educational level of the industrial labor force.

Problems faced by the Chinese Communists in attempting to raise the technical level of the industrial labor force include an illiteracy rate of approximately 80 percent, a shortage of teachers and school facilities, a shortage of qualified candidates to meet the enrollment quotas of institutions of higher education, and faulty planning in the coordination of school expansion. All these problems have been recognized by the government and are being attacked vigorously.

It is estimated that almost all the education and training goals in the First Five Year Plan will be fulfilled, many of them by the latter part of 1956. The most significant shortcoming in this program is the slow rise of the graduation rate of institutions of higher education.

Engineers in the industrial labor force will remain in short supply not only through the First Five Year Plan but also through the Second Five Year Plan (1958-62) and the Third Five Year Plan (1963-67).

I. Introduction.

The effort of Communist China to create a large industrial base in its traditionally agricultural economy requires investment not only for capital equipment but also for education and training of industrial manpower. The planned development requires skilled labor in far greater numbers than can be found in Communist China's large but mainly unskilled labor force. This lack of industrial skills can be remedied only by a major effort in both education and training, the former to use formal methods for teaching more advanced technical specialties and the latter to develop skills through practical techniques.

II. Demand for Technical and Skilled Workers.

The number of educated and trained employees and the level of skill needed by the expanding industrial operations in Communist China cannot be defined precisely. Economic planners in China apparently are proceeding on the basis of very general estimates. The First Five Year Plan, for example, required the following during 1953-57:

> All departments and state agencies in the national economy must increase by about one million their employment of specialized personnel of all types graduated from higher or secondary schools. At the same time, organs of the Central People's Government concerned with industry, transportation, agriculture, and forestry, must also increase their employment of skilled workers by about one million. To fulfill the needs of these 5 years and complete the necessary preparation for the Second Five Year Plan [1958-62], the state must plan the distribution, expansion, and utilization of all higher and secondary vocational schools. Moreover, it must fully utilize the facilities of the various enterprises and organs to train all types of skilled construction

personnel, thereby increasing the understanding of theory, administrative policies, service, culture, and the level of skill of cadres on the job. 1/*

Although rapid developments in industry make it difficult to predict the demand for technicians with any accuracy, it is assumed that the demand will be great because of what appears to be a general shortage of educated and trained workers.

A. Shortage of Trained Employees.

The doubling of the industrial labor force in Communist China between 1952 and 1956 was not accompanied by a proportionate rise in quality or skill. Despite continous efforts to expand training, the increase in technicians lagged behind increases in unskilled and administrative workers. 2/ Although the ratio of technical workers to the total labor force was raised somewhat by a campaign against overstaffing of administrative and service units, 3/ the problem of increasing absolute numbers of technicians remained dependent on the time-consuming process of training. Heavy industry, for example, despite a high priority in the industrialization program, has been described as having an extremely backward technical foundation. 4/ This backwardness exists in spite of reports that intensive training has increased the proportion of technical employees in the heavy industries to 5.7 percent of the total number of production workers. Although this proportion is high for Communist China, the average technical grade** (between 3.2 and 3.5 in 1955) of workers in heavy industry is still less than the technical grade of 4 or more required by the new Soviet-aid plants.

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** Technical grades apparently are an adaptation of the eight Soviet categories of worker skill. Although these grades are not uniform throughout Communist China, the following example for a machine plant is probably typical 5/:

Type of Worker	Grade	Average Age
Engineers and skilled technicians	8th	42
Skilled workers	5th to 7th	35
Unskilled workers	1st to 4th	27
Apprentice workers	1st and 2d	16

Current shortages of trained labor for industry in Communist China can be traced to traditions which put the highest premium on a literary rather than a technical education and restricted education to the few. One result of the traditions has been widespread illiteracy, estimated by the Communists to cover at least 80 percent of the population. 6/ Illiteracy tends to be highest among the peasantry, but even among the urban industrial workers inability to read has seriously hindered the expansion of technical skills. Among industrial workers (the elite of the labor force) only 50 percent are literate, and in certain industries, such as coal mining and building, the proportion of illiterates is considered to be more than 60 or 70 percent of the total. 7/

In addition to the severe problem of illiteracy, technical education and training produced few graduates in the first half of the 20th century in Communist China. During 1928-48 the science and other technical graduates of the institutions of higher education of China totaled only 70,000, of whom 32,000 were engineers. 8/ During the same period, technical graduates from the secondary vocational schools totaled approximately 50,000. 9/ Although the prestige of the more technical, Western-style education grew steadily after 1928, the rate of growth was slow because of the interruption by the Sino-Japanese War of 1937-45 and the inherent difficulties of instituting a new system of education. After World War II the political and economic problems of China were such that the Nationalists had only limited success in their attempts to expand technical and vocational education.

In addition to the shortage of training facilities, the present population of Communist China has matured in an environment in which machines and industrial processes were a distinct novelty. Because of this cultural background, the time required to learn a particular industrial skill is assumed to be longer in China than in an industrial nation such as the US. If the level of skill of a job is determined, in part, by the length of time required to learn it, jobs rated as unskilled in the US might be rated as semiskilled in Communist China just as semiskilled jobs in the US might be classified as skilled jobs in Communist China. In the field of manpower statistics it is often necessary to discount Chinese terms in this manner in order to reflect the implicit differences in concepts of the Chinese Communists and those of the West.

B. Dependence on Foreign Technical Workers.

The technical level of industrial enterprises developed in China before 1949 was maintained principally by foreigners, with the result that the Chinese got little industrial experience. In Manchuria, for example, Japanese efforts at industrializing the area, during 1932-45, were accomplished almost exclusively by Japanese managerial and technical employees. Chinese laborers were hired for unskilled and semi-skilled work, and only a relatively small number achieved the status of skilled workers.

When the Chinese Communists came to power in 1949, they continued to depend on foreigners for technical ability in economic reconstruction and industrial development. By interning many of the Japanese specialists, the Chinese authorities obtained some of the best experts on Manchurian industries. In addition, the Chinese received technical aid from the USSR, and Soviet experts entered practically every phase of the economic life of China.

The contribution of Soviet Bloc experts in the industrial field has been especially significant, extending as it does from high-level planning and technical positions down through plant operations to the installation, maintenance, and operation of Soviet machines and equipment. Consequently, the influence of Soviet techniques on Chinese Communist industry is widespread and pervasive. The exhortation to "learn from the Soviet Big Brothers" is based considerably on the necessity of working with Soviet industrial equipment. Satellite technicians also have become increasingly active in China. 10/ Although their primary function is to install new equipment, they are simultaneously training Chinese to operate and maintain the equipment. By making maximum use of these foreign experts, the Chinese have hastened the transition from a reconstruction stage to the launching of the First Five Year Plan. This development almost certainly would have faltered if it had not been for the aid of foreign technicians. The Chinese Communists, however, have made it clear that dependence on Soviet Bloc industrial workers is only an expedient and that the solution of the problem of technical skills lies in a long-range domestic program of education and training.

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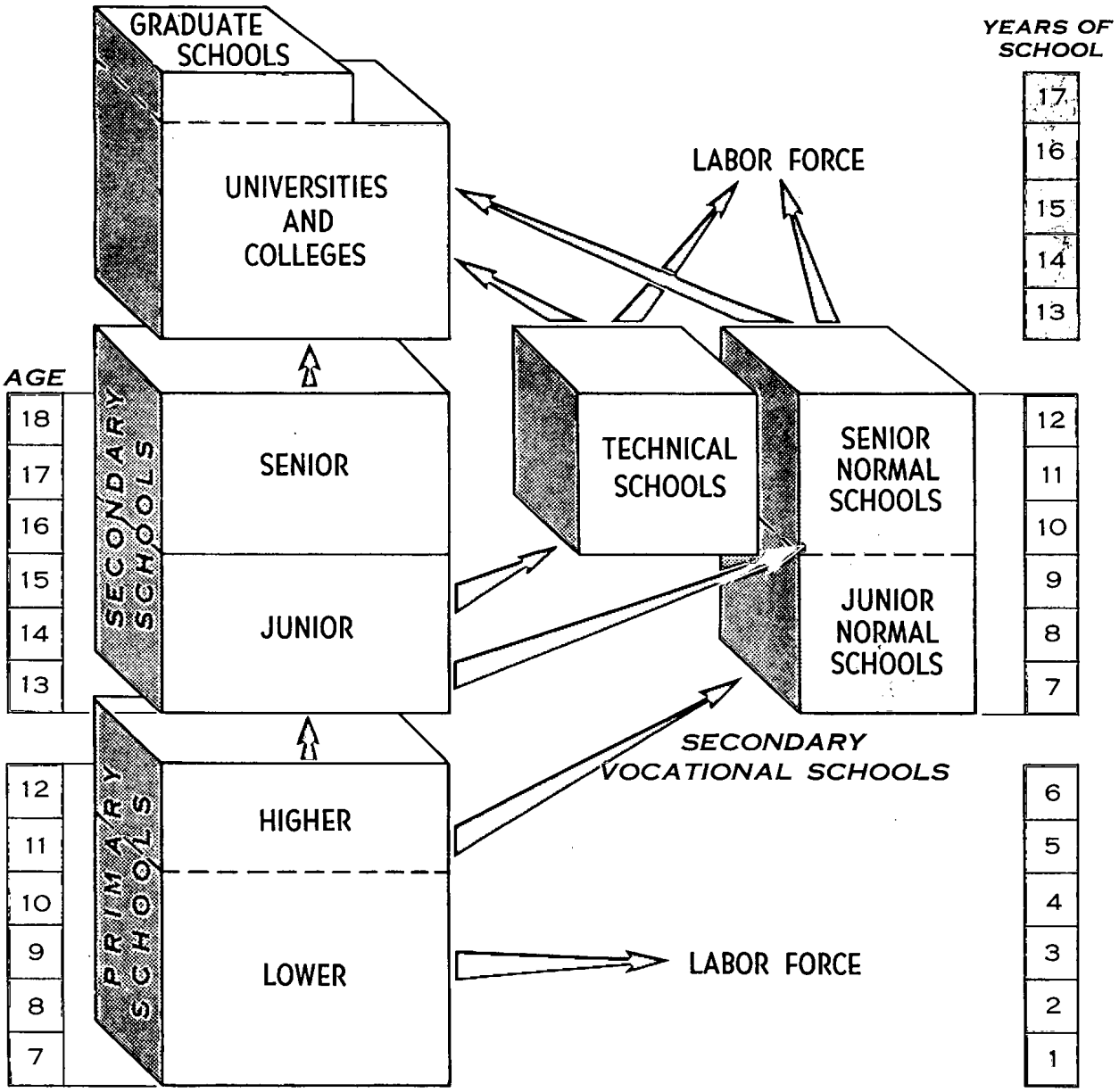
COMMUNIST CHINA

EDUCATIONAL SYSTEMS, 1956



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III. Education and Training of Technical and Skilled Workers.

A. Educational System.

The educational system of Communist China has the important responsibility of developing enough people with technical competence and political reliability to accomplish the regime's long-range economic plans. To achieve this aim, education has been reorganized and reoriented, and radical changes have been made in subject matter and content of courses. This revised organization, however, has been attached to virtually the same school structure as existed under the Nationalists. (For the organization of the educational systems in Communist China, see the accompanying chart.*) In general, the Nationalist system included 6 years of primary education, 6 years of secondary education,** and 4 years of higher education. 11/ Primary schools were divided into a lower section of 4 years and a higher section of 2 years. The 6 years of the middle school were divided into the junior middle schools, requiring 3 years, and the senior middle schools, requiring 3 more years. Secondary vocational schools required approximately 3 years, taking graduates of junior middle schools.

The Chinese Communists attempted one major change in the school structure in October 1951, when they ordered primary schools shifted from a 6-year system to a 5-year system. 12/ Although this change would have lengthened the period of study for the majority of primary students -- most of whom leave school after the 4 years of the lower school -- probably it also would have lowered the quality of middle school candidates by shortening their primary education 1 year. The adoption of this reform and its subsequent rejection typify a pattern of Communist educational policy: precipitate action toward quantitative goals, followed by recognition of the need for quality.

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* Following p. 8.

** The terminology used to describe Chinese schools is often confusing because of the variety of English equivalents used in translations. In this report, secondary education is used for two kinds of schools -- middle schools and vocational schools. Middle schools are divided into junior middle schools and senior middle schools. The term secondary vocational education includes normal schools and technical schools, the latter also being called secondary specialization schools by the Chinese Communists.

This pattern occurred not only in the increase in short-term abridged courses 13/ but also in the early graduation of students. 14/ Because the quality of the graduates declined, these expedients have since been dropped, and the period of study in both institutions of higher education and secondary vocational schools is being expanded. The institutions of higher education are lengthening undergraduate courses from 4 to 5 years, especially in the industrial fields. 15/ Secondary technical schools are extending study from 3 to 4 years. The various types of secondary technical schools now require the following number of years for graduation: 3 to 4 years for industrial schools; 3 years for agricultural, forestry, and pharmacy schools; and 2-1/2 to 3 years for planning, economics, and accounting schools. 16/

The influence of the USSR on the educational system of Communist China is gradually becoming more pronounced. The Chinese Communists made no initial moves to import directly Soviet patterns for their school expansion program but tended to rely on the existing school system for their organizational base. Subsequent modifications of Chinese schools, however, were almost all influenced by the experience of the USSR. The formal educational system reflects Soviet influence mainly in the curriculums and content of courses, whereas the development of spare-time schools, workers' technical schools, and workers' technical classes have been modeled on Soviet patterns, not only in curriculums and content of courses but also in organization of schools and classes.

B. Relationship of the Educational System to Industrial Needs.

The need for technical manpower in Communist China can be met only by expansion of all levels of education and training. Supplying the demand for professional and semiprofessional workers in industry depends not only on the graduation rate of the institutions of higher education and of the secondary vocational schools but also on the graduation rate of the middle and primary schools, the main sources of candidates for the higher institutions. The importance of the middle and primary schools has been acknowledged only recently, mainly as a result of the failure of middle schools to furnish enough graduates to meet the needs of rapidly expanding enrollment for the higher institutions.

1. Primary and Secondary Education.

There is considerable evidence that faulty planning has complicated and delayed education in Communist China. Nowhere is this more clearly shown than in official policies toward the middle schools. Before 1956 the government actively discouraged graduates of primary and junior middle schools from further schooling. The reason cited was that the industrial priority of the First Five Year Plan did not allow additional investment for building middle schools. 17/ As an alternative to further education, the students were ordered to mobilize for production work, 18/ although it was admitted by August 1955 that, because of continued urban unemployment, city graduates of junior middle schools and primary schools could not be placed in jobs. 19/ This program deprived the colleges of a regular source of candidates for admission and resulted in severe enrollment difficulties. The government completely reversed itself, therefore, and began a campaign demanding that students be prevented from discontinuing their studies. 20/

As a part of this policy shift, planned enrollment in senior middle schools has been raised drastically. The 1956 quota calls for 366,000 new enrollees, 21/ a much higher figure than was required by the First Five Year Plan. Even though this move indicates a belated recognition of the crucial role played by senior middle schools, no great increase in the graduation rate is expected for the next 3 years, since new enrollment for senior middle schools has averaged less than 200,000 students annually over the past 3 years. A correlated difficulty is that the raised enrollment in senior middle schools, plus even sharper increases in the enrollment of secondary technical schools, is currently outstripping the graduation rate of the junior middle schools. 22/ The net effect of these changes has been to move the educational bottleneck from the senior middle schools to the junior middle schools.

According to the Five Year Plan, junior middle schools were scheduled to graduate 4 million students during 1953-57, more than enough to meet the enrollment plans of the senior middle schools and the secondary vocational schools, which called for 2 million new enrollees during the same period. This comfortable margin between supply and demand, however, presumably has diminished under the dual impact of unprecedented increases in demand and a dwindling supply caused by the government's efforts to discourage primary and middle school graduates from continuing their education. To fulfill the new enrollment quotas, the government is attempting to recall for further study the junior

middle school graduates that it previously diverted into the labor force. 23/ In the case of senior middle school students who have left to seek employment, the Ministry of Education is helping to organize make-up classes so that these individuals can qualify for taking the entrance examinations for institutions of higher education. 24/ This is additional evidence that the economic planners have realized that graduates of primary and secondary schools are more valuable as potential technicians than as immediate increments to the labor force. Because the industrial labor force already has an oversupply of unskilled workers, 25/ the main justification for pulling primary and secondary students into the labor force was a shortage of school facilities and teachers.

2. Higher Education.

Not only is the need for technical specialists in the industry of Communist China still unsatisfied but also it is expected to increase with the use of new techniques and more complicated equipment. In response to this situation, institutions of higher education have been thoroughly reorganized and their enrollment has been greatly expanded. It appears that, as a result of this priority treatment, the goal of the First Five Year Plan to have enrollment in these institutions by the end of 1957 be double that of 1952 not only will be achieved but also will be exceeded. In spite of impressive achievements in raising the enrollment figures, however, the proportion of graduate specialists in the industrial labor force is still small, and the proportion in the total population is minute.

Western-style institutions of higher education in Communist China graduated 211,000 students during the 35-year period of 1913-47 26/ -- approximately the same number as the Communists claim to have graduated during the 6-year period of 1950-55. 27/ While they were increasing the output of graduates, the Chinese Communists were reorganizing the higher institutions. The primary objective of this reorganization was to strengthen technical education by developing a greater degree of specialization, and the number of the institutions declined from 201 in 1952 to 182 in 1953, largely because of consolidation of comprehensive universities into technical institutes. 28/ The training of engineers received top priority in this reform, as illustrated by the fact that 60 percent of the college buildings constructed in 1953 were for engineering colleges. 29/

According to the Five Year Plan, by 1957 the reorientation of education will result in a total of 208 institutions of higher education, comprising the following: 15 comprehensive universities, 47 institutes of technology, 29 institutes of agriculture and forestry, 5 institutes of finance and economics, 5 institutes of political science and law, 43 normal schools, 32 medical colleges, 8 language institutes, 6 physical culture institutes, 14 arts and crafts institutes, and 4 other schools of higher education.

a. Enrollment.

The First Five Year Plan stipulated that during the 5-year period 543,000 new students were to be enrolled in institutions of higher education and that by the end of 1957 there were to be 434,600 students in the 208 institutions. Recent announcements, however, indicate that the enrollment goals are to be revised upward. In a speech before the National Peoples Congress in June 1956 the Minister of Higher Education stated that in 1956 there would be over 380,000 students in institutions of higher education, following the admission of 163,000 new students in the fall. 30/ This plan for higher education for 1956 represents an increase of about 30 percent of the number of students in 1955. The number of students in the institutions by the end of 1957, furthermore, is scheduled now to exceed 510,000 students, an increase of more than 34 percent of the number previously scheduled for the end of 1956, under the First Five Year Plan. If these revised goals are reached, the original 1957 goal of the Five Year Plan will be surpassed by 17 percent. The Minister of Higher Education has admitted that although these goals are high relative to the current capacities of institutions of higher education and although considerable difficulties will be experienced in attempting to assure the quality of the students, the imperative demands for graduates required such an expansion. That the institutions will continue to expand greatly is clear from the tentative draft of a new 12-year plan for education announced in June 1956. This plan has been coordinated with the expected demands for trained people through the Third Five Year Plan (1963-67), and on this basis it has been estimated by the Ministry of Higher Education that from 3 million to 4 million new students will have to be admitted during the "coming 12 years." To accommodate this influx, more than 300 new institutions of higher education will have to be built. 31/

b. Graduation Rate.

In spite of the rapid advance in enrollment rates, there will be an inevitable timelag of 4 or 5 years before the high enrollment is translated into high graduation rates. The scheduled shift from 4-year to 5-year courses is expected to affect the graduation rates, as will the normal attrition of the student population. Considering the timelag and the small size of the enrollment in institutions of higher education for 1949-54, it is difficult to accept recent official announcements that 153,000 students graduated from them in the first 3 years of the First Five Year Plan period. 32/ Earlier official announcements for these 3 years were as follows: 35,000 graduated in 1953, 33/ 40,300 in 1954, 34/ and 50,000 in 1955. 35/ According to the earlier figures, the graduation total for 1953-55 was 125,300. It is likely that the lower figure refers to graduates of the full 4-year term, whereas the higher figure may include students who finished the accelerated 3-year courses and the 2-year vocational courses formerly offered by many institutions of higher education. Whatever the explanation for this change in official statistics, it is doubtful whether 153,000 students completed the full 4-year course during 1953-55. Moreover, by using the new figures, the Chinese Communists could claim fulfillment of the Five Year Plan for 283,000 graduates of institutions of higher education, because the 1956 graduation total is expected to be 64,000 students, 36/ leaving only 66,000 to be graduated in 1957 to reach the total of 283,000 for the Five Year Plan.

c. Allocation of Graduates to Technical Fields.

The proportion of graduates of institutions of higher education to the total population of Communist China is still extremely low. In 1949, for example, it is estimated that there were only 3 or 4 persons with higher education per 10,000 Chinese. 37/ Under the intensified program of the Communists, this was raised in 1955 to slightly more than 6 persons per 10,000, compared with 100 per 10,000 for the USSR in 1950 and 320 per 10,000 for the US in 1953. 38/ These proportions give little indication, however, of the stress on technical education or the proportion of the graduates entering technical fields. In both cases, Communist China has shown considerable activity. The First Five Year Plan indicates that at least one-third (94,900) of the graduates expected during 1953-57 will be distributed in technical fields as follows (it is estimated that 15 to 18 percent of the 94,900 graduates will remain in school to teach technical subjects or to enter graduate studies): 25,100 in architecture and municipal construction;

19,300 in machinery and tool manufacture; 10,000 in geology and surveys; 7,600 in mineral resources; 7,500 in power; 5,100 in chemical engineering; 4,700 in transportation, posts, and telecommunications; 3,300 in light industry; 3,200 in metallurgy; 2,100 in surveying, cartography, meteorology, and hydrography; 1,700 in manufacture of electric motors and equipment; 600 in paper manufacture, timber cutting, and lumber processing; and 4,700 in others. 39/ Furthermore, government controls allow these individuals to be sent wherever the need for their technical abilities is greatest. This mobility is an effort to counteract the limited numbers of specialists by distributing them for maximum advantage to the state.

C. Secondary Vocational Education and Workers' Training Schools.

Vocational training in Communist China is composed of a variety of schools covering a rather broad range of technical levels. Vocational schools, which are part of the formal educational system, are set up to train semiprofessional workers qualified to assist engineers and other specialists. Spare-time schools, on the other hand, have been developed to further the education of experienced workers whose skills may have carried them to levels of responsibility requiring more formal education. In addition, workers whose technical advance is limited by illiteracy are given an opportunity to learn to read and write in spare-time schools. Skilled workers are trained by techniques which minimize theory and emphasize practical experience. The traditional master-apprentice relationship is still the primary means of teaching basic production skills. To accelerate this process and broaden the instructor's audience, workers' technical schools and workers' technical training classes have been organized in industrial plants throughout China.

1. Secondary Vocational Schools.

a. Organization.

Following a decision by the Government Administrative Council in September 1954, 40/ secondary vocational education in Communist China was redirected along lines of greater specialization and practical application. Although secondary vocational schools were already moving in this direction, the government's action hastened the process by shifting each one from the administrative control of the Ministry of Higher Education to the control of the economic or technical

ministry most closely concerned.* For example, the Ministry of the Petroleum Industry assumed the administration of China's 6 petroleum schools, the Ministry of the Coal Industry took over the 11 secondary technical schools on coal mining, 41/ and the Ministry of Heavy Industry took over about 29 secondary technical schools on fields under its jurisdiction. Despite its loss of administrative control, the Ministry of Higher Education retained the responsibility for providing "unified guidance" for secondary technical schools throughout the country. 42/ This guidance entails drawing up teaching outlines and publishing textbooks for the more general courses, as well as offering advice and coordinating instruction wherever necessary. 43/

The number of secondary vocational schools has fluctuated considerably with each successive reorganization effort. These efforts have included both expansion and contraction because, before 1954, mergers were eliminating smaller schools faster than new ones could be organized. 44/ Consolidation was completed largely by the beginning of 1954, when the number of schools began to increase. During 1955 the number of secondary technical schools ranged between 500 and 573, 45/ the approximately 170 industrial secondary technical schools being the most numerous. Technical schools in agriculture, forestry, and meteorology totaled 120, and the balance was made up of technical schools in finance and economics, public health, physical education, and arts and crafts. Normal schools add approximately 400, giving a total of over 900 secondary vocational schools in 1955. 46/

b. Curriculum.

The studies offered by the secondary technical schools in Communist China include more than 200 specializations, of which 163 are industrial. Because these are sponsored by 29 different departments of the central government, each with its own technical needs, no standard curriculums can be enforced for all schools. Certain characteristics, however, are common to most of the schools. Some sort of practice work, for example, is required for all secondary technical schools and, according to a directive on the subject, is expected to take from

* The exception is secondary schools in agriculture and public health, in which, because of the large number of schools, provincial departments of agriculture and public health were accorded direct control. Even these secondary schools, however, are under the guidance of the Ministries of Agriculture and Public Health.

25 to 35 percent of the time spent in school. 47/ To facilitate this practical application of classroom instruction, school sites have been chosen in the vicinity of industrial or mining enterprises corresponding to the technical courses being offered by the school. 48/ The result has been a close working relationship between industrial plants and the technical schools supplying the plants with intermediate technicians. This practice has led, in turn, to a higher degree of specialization in the courses of study than might otherwise have been attained.

In addition, secondary technical schools have courses on political indoctrination. In the simplest cases this may be no more than a controlled discussion of current events. Because attendance is compulsory, however, the curriculums must be adjusted, usually at the expense of study or formal instruction.

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The formal course in secondary technical schools usually consists of a basic science course for the first year, with increasing specialization for the remaining 2 or 3 years. [redacted] first-year courses include 50X1 mathematics (differential and integral calculus as well as solid geometry), physics, chemistry, drafting, a foreign language (usually Russian), and physical education. Except for the strong emphasis on scientific subjects, the first-year courses roughly parallel those offered by senior middle schools. In the second year there is a continuation of most of the basic courses, plus training in the school's specialization and some practical work in this field. The third year usually features increased emphasis on the specialization, including both theory and practice. Practice training at this point usually consists of work experience, with the trainee being exposed to many of the responsibilities and problems which he must assume upon graduation.

c. Enrollment.

The entrance requirements for secondary vocational schools in Communist China specify that enrollees be graduates of junior middle schools or the equivalent. They must also be 15 to 25 years old except for special categories such as industrial workers, cadres, and national minority members, the age limit of which may be extended to 30 years. In addition, the applicant must pass a three-part examination on Chinese political history, Chinese language, and mathematics. In any case of doubt, priority enrollment is extended to members of politically reliable groups such as Communist Party cadres, industrial workers, dependents of military people, and demobilized servicemen. 50/

The number of students in secondary vocational schools in Communist China tripled during 1949-53 (the number of students in secondary schools during 1949-57 is shown in Table 1*). Within this category, technical schools increased the number of their students fourfold, and normal schools more than doubled theirs. This rapid rate of growth decreased in 1954, when the number of students leveled off. During the 1953-54 school year there were 669,000 students in all secondary vocational schools, a figure which differs only slightly from the original goal of 671,800 students by the end of 1957, the final year of the First Five Year Plan. During the same period, however, secondary technical schools were scheduled to increase from 300,000 students in 1953 to 453,000 in 1957. Normal schools, on the other hand, were supposed to cut from 369,000 students in 1953 to a planned figure of 218,500 in 1957. This drastic retrenchment of normal schools has since been recognized as having a deleterious effect on the junior middle and primary schools. Accordingly, there have been statements that normal schools will have to be expanded to meet the current shortage of teachers. 51/ In view of the enrollment difficulties mentioned above, however, normal schools cannot be expected to expand greatly without sacrificing quality in enrollment standards.

New enrollment in secondary vocational schools scheduled for 1956 is expected to total 444,000 students, raising the number of students in 1956 to 801,000, or 149 percent of the 1955 level 52/ and 119 percent of the original goal of 672,000 students for the end of 1957. Senior middle schools are also scheduled to enroll 366,000 new students in 1956, 53/ which together with the secondary vocational school requirement, creates a demand for 810,000 candidates with at least junior middle school education. The total number of junior middle school graduates in 1956, however, was only 787,000 students. 54/ To prevent uncontrolled competition, the Ministries of Education and Higher Education have agreed on a system of priority for enrolling junior middle school graduates. The basic premise is that no attempt will be made to meet the demands of economic organs for junior middle school graduates. Instead, the entire graduating class is expected to continue its schooling. Top priority for enrolling these graduates goes to the senior middle schools, with the enrollment needs of the secondary technical schools being met next. Normal schools have the lowest priority, a factor expected to disturb their enrollment plans seriously. 55/ Preferential treatment shown the senior middle schools is a direct

* Table 1 follows on p. 17.

Table 1

Number of Students in Secondary Schools in Communist China a/
1949-57

Thousand Students

	1949-50	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56	1956-57 b/	Five Year Plan for 1957 c/
Regular middle schools									
Senior	207	238	184	260	360	478	582	N.A.	724
Junior	832	1,067	1,384	2,230	2,572	3,109	3,318	N.A.	3,983
Total d/	1,039	1,305	1,568	2,490	2,931	3,587	3,900	5,060	4,707
Vocational schools									
Technical	77	98	163	290	300	300	323	N.A.	453
Normal	152	159	220	345	369	308	214	N.A.	219
Total d/	229	257	383	636	669	608	537	801	672
Short Course for Workers and Peasants		4	13	20	50	51			
Grand total d/	1,268	1,566	1,964	3,146	3,628	4,246	4,437	5,861	5,379

a. 56/
b. 57/
c. Because of the recently revised 1956 figures, goals of the First Five Year Plan are now considered too low even for approximating the number of students in 1957.
d. Because of rounding and conflicting information in sources, figures may not add to the totals shown.

reflection of the privileged status accorded higher education, which must depend on the senior middle schools for expanding its enrollment. In a further effort to meet the higher enrollment goals, the government has encouraged past graduates of junior middle schools to take the entrance examinations for the senior middle and technical schools. 58/ It is not yet clear how the quota for new enrollment for 1956 will be divided between the secondary technical schools and the normal schools, although both are expected to surpass the original goals of the Five Year Plan. If secondary vocational schools reach the new goal of 801,000 students in 1956, the goal for the Five Year Plan will be exceeded by 19 percent a full year before it was to be achieved. Thirty-six percent of the 1957 planned number of students in secondary vocational schools were expected to be in the industrial schools (the number of students in secondary vocational schools in Communist China, by type of specialization, during 1952-57, is shown in Table 2*). In the school year 1954-55 this proportion was only 25 percent. The number of students in industrial schools in 1956 is probably midway between these figures. It now seems unlikely that the normal schools will be cut as drastically as indicated in the Five Year Plan goal for 1957.

d. Graduates and Their Work Assignments.

In 1955, secondary technical schools in Communist China graduated 100,000 students, and more than 78 percent of them promptly began work at state construction projects. 59/ The number of graduates for 1955 was twice as large as the average annual number of graduates for 1951-54, when a total of 200,000 students reportedly graduated from the technical schools. 60/ At this rate the Five Year Plan goal of 422,800 graduates from technical schools will be reached and probably exceeded. It is probable that the Chinese Communists will continue to be successful in allocating a high percentage of technical school graduates to state projects. Industrial schools, which will turn out 180,000 of the technical school graduates, expect to channel all their graduates into state industry and mining.

The supply of graduates of secondary technical schools, however, is still not enough to meet industrial demands. This fact is attested to by official statements and a constant concern that technicians be allocated according to the needs of the economy. The result has been increased enrollment and a more efficient utilization of the

* Table 2 follows on p. 19.

Table 2

Number of Students in Secondary Vocational Schools in Communist China, by Type of Specialization a/ 1952-57

Thousand Students

Specialization	1952-53	1953-54	1954-55	Five Year Plan for 1957
Industry	111,400	129,700	151,700	244,000
Agriculture and forestry	66,600	68,700	58,700	98,800
Public health	59,400	57,700	58,600	70,900
Finance and economics	52,300	42,300	28,800	33,300
Teaching	345,200	369,000	308,000	218,500
Other	700	1,000	2,200	6,300
Total	635,600	668,400	608,000	671,800

a. 61/

trained employees. To enforce the priority demands of Communist China, it was necessary to distribute graduates according to China's needs, with little or no reference to the individual's desires. 62/

Although the industrial plants have had top priority for technical school graduates, the urgent need for qualified candidates of institutions of higher education may change this priority. Secondary technical school graduates are now encouraged to take the entrance examinations for higher institutions, 63/ whereas in the past they were denied the opportunity to matriculate at them until they had worked a definite period of time and could obtain the approval of their employer to leave their work. 64/ The enrollment priority given institutions of higher education is responsible for channeling off practically all the senior middle school graduates and currently is diverting some secondary technical school graduates from the labor force. In addition, all the graduates of junior middle schools are expected to continue their education in senior middle schools or secondary technical schools. Thus the distribution of graduates from the secondary school system is

focused mainly on continuation of studies in higher education and not on entering the labor force. If the increased enrollment for higher education draws off a large number of technical school graduates, the supply of junior technicians to the industrial labor force will be curtailed. This practice would complicate further the Chinese Communist desire to maintain in industry a ratio of approximately three junior technicians to each technician graduated from an institution of higher education. 65/ Although the ratio of graduations from vocational schools to those from colleges during the Five Year Plan is scheduled to be about 3 to 1, the more significant ratio of secondary technical graduates to graduate engineers of the higher institutions is expected to be 2 to 1. On the assumption that some of the technical school graduates will be enrolled in the higher institutions, the ratio of junior technicians to senior technicians in industry is expected to fall even lower.

2. Spare-Time Education and Training.

Spare-time training, as a supplement to the formal educational system, is being expanded rapidly in Communist China in an effort to meet the urgent need for trained employees. The main advantage of this type of training is that it allows experienced industrial workers to raise their educational level without losing time on their jobs and thus minimizes the cost of training by insuring that production is not reduced and wage costs are not inflated. It further aids political reliables such as industrial supervisors, model workers, and technical workers to raise their educational levels to their levels of authority. The disparity between educational background and position of authority is an extremely serious problem. According to Chinese statements, 30 percent of the "engineering and technical" employees in factories and mines have educational levels no higher than primary school and 5.4 percent of them are illiterate. 66/ Basing their estimates on Soviet experience, Chinese Communist authorities have concluded that spare-time education will be the most effective method for training industrial workers, as well as for developing new industrial supervisors. 67/

Unlike on-the-job training, which is mainly limited to raising the skill of the worker, spare-time schools offer a wide range of academic subjects on a variety of levels, including literacy schools, primary schools, middle schools, vocational schools, and institutions of higher education. An enrollment in 11,700 spare-time schools in 1955 was annonnced as more than 3 million students, 68/ but this figure includes at least 2,840,000 students in literacy classes. 69/ The

remainder of the enrollment included 16,000 spare-time students in higher education 70/ and an unknown distribution of primary and secondary school students. This preponderance of students in literacy schools is consistent with a policy decision made by the National Conference on Spare-Time Education for Industrial Workers to eliminate illiteracy among workers by 1958. It was further resolved that, after achieving this first step, the education level of the majority of industrial workers would be raised to that of primary school graduates by 1962 and to that of junior middle school graduates by 1967. 71/ In addition, the enrollment in spare-time courses, for higher education is scheduled to increase sharply in 1956, with a planned new enrollment of 53,000 students. 72/ This number is over 3 times the total enrollment in spare-time, higher education in 1955.

Achieving these goals, however, will require considerable expansion of the system of spare-time education, as well as the elimination of problems now hindering the success of the program. The following quotation from an official Chinese Communist source presents an accurate picture of current problems in spare-time training:

> Spare-time education for employees is not sufficiently systematized and is not on a regular basis. It lacks an adequate teaching system and curriculum, and the quality of teaching is poor. Employees are not guaranteed a regular fixed time for study. There is a shortage of middle-school and university teachers; they in turn are not given regular and adequate guidance. Leadership in spare-time education by government educational departments has been generally weak. The industrial and administrative departments in enterprises have not organized industrial spare-time education; neither have the trade unions organized industrial spare-time education; neither have the trade unions given much attention to this problem. Owing to deficiences in long-term planning and management, employee spare-time education has become routine and static. 73/

The shortage of full-time teachers is a particularly difficult problem because spare-time schools have a lower priority for recruiting teachers than do the regular middle schools and institutions of higher education. As a consequence, spare-time schools have been depending on part-time

teachers selected from various sources, including plant employees, relatives of employees, and regular school teachers working after hours. 74/ The problem of insufficient time for both training and work has been met generally by shortening the hours of training. Overtime production work has been cited as the main cause of curtailing the worker's spare-time study. The National Conference on Spare-Time Education has suggested that workers be guaranteed the following minimum hours for spare-time classes: 6 hours a week for primary and literacy schools, 8 hours for junior middle schools, 12 hours for senior middle schools and vocational schools, and 16 to 20 hours for classes of higher education. 75/

Most of the other difficulties can be traced to jurisdictional confusion among the industrial plants, the trade unions, and the educational departments of the government, all of which are involved in developing policy, drafting teaching plans, compiling teaching materials, and hiring teachers for each of the individual spare-time schools. Lacking unified direction and policy, spare-time schools have tended to become makeshift adaptations to local conditions, with wide variations in standards of instruction and organization. As they are now set up, these schools will contribute little to alleviating shortages of technical employees. They should furnish, however, the best method for reducing illiteracy among industrial workers. Because the rate of illiteracy among industrial workers is about 50 percent, these schools can make a contribution of considerable significance.

3. Training of Skilled Workers.

The training of skilled workers in Communist China must be considered separately from the training of technicians or semiprofessional workers because the categories are different in Chinese Communist terminology. Skilled workers are defined by the Chinese as "workers who have undergone a definite period of training and who have some technical proficiency and can work independently ... . Although all workers have skills, the difference is whether their skills are trained or untrained." 76/ The lack of precision in this definition may help explain the absence of statistics on skilled workers. In spite of this vagueness, however, the Chinese have made estimates of the number of skilled workers to be trained during the period of the Five Year Plan. This Plan goal, announced in 1955, called for the training of 920,300 skilled workers, divided among the economic ministries as follows 77/:

Ministry	Number of Skilled Workers
Ministry of Heavy Industry	176,800
Ministry of the Fuel Industries	172,000
Ministry of Machine Industries	174,100
Ministry of the Textile Industry	55,400
Ministry of Light Industry	22,900
Ministry of Geology	11,800
Ministry of Building	39,800
Ministry of Agriculture	21,500
Ministry of Forestry	33,000
Ministry of Railroads	158,800
Ministry of Communications	19,800
Ministry of Posts and Telecommunications	19,900
Ministry of Labor	14,500

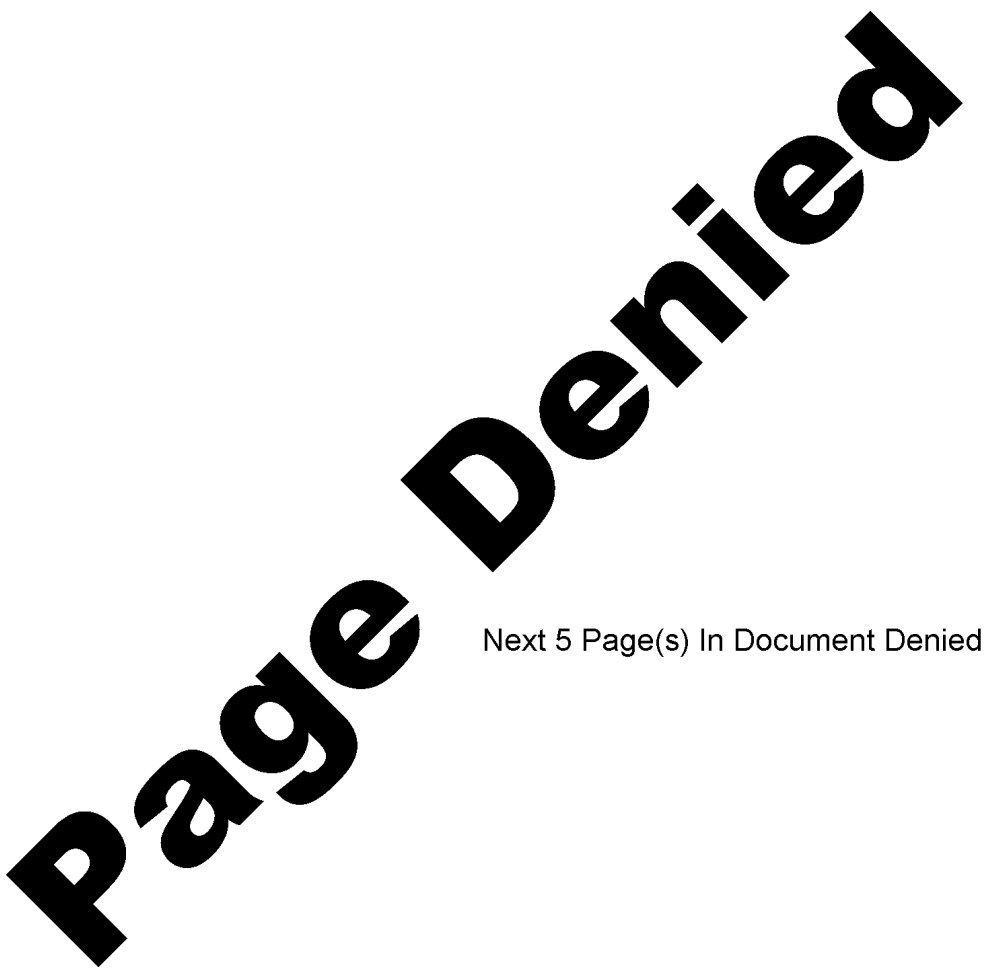
These workers are to be trained by at least three different methods: in workers' technical schools, in workers' technical training classes, and by the traditional master-apprentice method. About 439,000 workers, or slightly less than half the planned total, will be trained by the master-apprentice method during the Five Year Plan. Generally this type of on-the-job training is both practical and easy to organize, but it is expensive when the master worker must interrupt his work for the benefit of only a few apprentices. To use the time of this skilled worker most efficiently, the system of workers' technical training classes was developed. As a result, the experience of highly skilled workers can be spread over a wider audience with less loss in production time. This highly adaptable type of training can be used on the job or after working hours, with the most common classroom being the factory production line. It is expected that, under the First Five Year Plan, 362,000 skilled workers will be trained by this method.

Workers' technical schools differ from the system of workers' technical training classes in that the schools have a more formal organization. According to the First Five Year Plan there were 22 of these schools in 1952, and it was planned to expand this number to 140 by 1957, training about 119,000 skilled workers during the 5-year period. 78/ Recent announcements, however, indicate that this Plan will be exceeded by the end of 1956, when it is planned to have 192 workers' technical schools. 79/ These schools are expected to enroll 97,000 new students in 1956 and to graduate 27,000 in the same year, a net gain of 70,000 students. The primary goal of these schools is to teach skills by "practice in the field." 80/ According to criticisms that have appeared

in the Chinese Communist press, the main shortcomings of these schools have been poor teaching methods, too little actual work practice, and weak ideological training. 81/ Because of the rather limited support and attention given these schools by the government, it is likely that for some time to come the skilled workers of Communist China will be trained by the master-apprentice method and to a lesser extent by the informal workers' technical training classes.

Although the Communist practice of developing extreme specialization in the training of skilled workers represents a saving in both time and expense, it tends to make skilled workers less adaptable to other jobs. This lack of adaptability is counterbalanced, however, by the availability of a large labor reserve and unusual mobility afforded by the government's efficient and ruthless allocation of skilled workers. Because generalized industrial skills are usually developed through a long period of diversified work experience, it is unlikely that this narrow specialization will be decreased easily. The Communists are committed to a program of accelerated, narrowly specialized training that sacrifices versatility in depth for a large force of skilled workers, no matter how narrow their skills may be.

Although both skilled and technical workers were in short supply when the Communists came to power in 1949, the skilled workers are now much less a problem. The relatively rapid advance made by the Chinese Communists in training skilled workers, compared with the training of technicians and specialists is caused mainly by the shorter time required for training and by the lower investment cost of training them. It is likely that the goal of the First Five Year Plan to train 920,000 skilled workers will be achieved without undue difficulties. In 1956, for example, 17 economic ministries of the Central Government will have 710,000 workers in training, of whom 280,000 (30 percent of the First Five Year Plan goal) are scheduled to complete their training in 1956. 82/ The quality of this training will vary considerably among industries and probably among plants in the same industry. Furthermore, because of the wide latitude of existing definitions of the skilled worker, the quantitative goal could be achieved merely by relaxing the standards for classifying the skilled worker.



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